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## BHCTP Monthly Discharge Monitoring Report

Month: August-17

Facility: Central Treatment Plant

Location: Bunker Hill Superfund Site

Contract Number: W912DW-16-C-0012 Amec Foster Wheeler

Total Flow For The Month From 006 Outfall: 57,756,400 gallons  
Sludge pumping to CIA sludge pond: 1,542,000 gallons

Total Flow From Kellogg Tunnel: 58,550,600 gallons

Percent of Influent Successfully Treated: 100.0%

13 sample days \* 6 parameters (Pb, Cd, Zn, Mn, TSS & pH) = 78 potential exceedances  
**78 - 0 exceedances = 78 78/78 = 100%**

### Results of Sampling Efforts:

All sampling has been performed in accordance with specifications and the Sampling and Analysis Plan.

Performance Evaluation (PE) sampling was not performed for this reporting period.

Trip blank and rinsate sampling was performed, with the results being reported on the 'PTM-004,RB,TB' page of this DMR.

### Highlights of Plant Maintenance and/or Plant Optimization:

**08-01-17** Performed monthly fire extinguisher inspection. All CTP fire extinguishers are fully charged and in good working condition at this time.

**08-01-17** Performed monthly pump and motor inspection. All CTP pumps and motors are in good condition at this time.

**08-01-17** Held a toolbox safety meeting to discuss the hazards associated with the annual AMD line video inspections

Performed continuous air monitoring during all confined space entry.

**08-01-17** Drained the Direct Feed Line in preparation for pre-cleaning video inspection.

**08-01-17** Performed the annual AMD line pre-cleaning video inspection. Also performed hydrojet cleaning of the upper section of the main line. The 350' upper section of the main line has no cleaning unit access.

**08-02-17** Performed the quarterly Direct Feed Line cleaning. Three cleaning bullets were run through the AMD line from the direct feed area to the CTP, with no issues to report. Performed six month main line and lined pond branch cleaning. Three cleaning bullets were used to perform this cleaning event with no issues to report.

**08-03-17** Performed the annual AMD line post-cleaning video inspection. Video inspection DVD's are located at the CTP.

**08-03-17** Installed and tested the #1 lime slurry loop return piping unit constructed by Mine Fabrication. The #1 lime slurry loop was tested and placed into service as the standby lime slurry loop.

**08-07-17** Received 39.5 tons of 3/8" minus pebble lime from Pete Lien & Sons. Placed into lime silo B.

**08-07-17** Maul Foster representative provided notification that the CDA Trust well purge water disposal will increase to approximately 150 gallons per day. The well purge water is currently disposed of at the lined storage pond. Maul Foster will provide a project specific disposal total at the completion of the project.

**08-08-17** Operators performed the monthly no load emergency generator run test. The emergency generator operated for thirty minutes as programmed with no issues or errors to report.

**08-09-17** Received 39.0 tons of 3/8" minus pebble lime from Pete Lien & Sons. Placed into lime silo B.

**08-10-17** During the weekly KT flume cleaning event a member of the mine crew stated that they will begin the in mine ditch cleaning this week. He did not indicate if the KT flows would be effected by this activity.

**08-15-17** Increased zinc levels noted in the August 9th and 11th treated discharge samples may be attributed to the in mine ditch cleaning activity. Zinc levels have increased from .273 mg/L to 3.17 mg/L.

**08-15-17** Operators tested the Main Line and Direct Feed Line flow control valves as the city sewer construction crew was excavating around the AMD valve control wires. All valve controls are in good working condition at this time.

**08-22-17** Operators performed the monthly full load emergency generator run test. The emergency generator operated all CTP components for one hour as programmed with no issues or errors to report.

**08-24-17** McCunes Instruments installed the secondary Aeration Basin pH meter. McCunes will evaluate the failed pH meter and provide a repair quote as soon as time allows. The repair quote will be submitted to the COR.

**08-24-17** Operators repaired an failed electrical connection on the Silo A dust collection motor. Dust collection system A is in good working condition at this time.

**08-29-17** The lime silo A dust collection system shaker motor was found in failed mode. OMER #011 will be placed back on the discrepancy item list and an electrician will be scheduled to inspect the motor.

**08-30-17** Electrician performed an inspection of the lime silo A dust collection system motor. The electrician determined the motor has failed. A replacement motor has been ordered.

**08-31-17** The new silo A dust collection motor has been received. The electrician will be scheduled to perform the electrical connections.

**08-31-17** Performed monthly reset of the KT and treated outfall flow meters. Documented monthly totals on the KT & 006 flow page of this report.

- The Kellogg Tunnel discharge flow increased by 10% from August 2016, from 53.2 mg to 58.5 mg.
- The Kellogg Tunnel zinc concentration increased by 22% from August 2016, from an average of 76 mg/L to 98 mg/L.
- The CTP operating pH set point was increased from 8.4 to 8.5 during KT extended low flow period.
- The flocculent dosage remained at approximately 1.6 PPM during this reporting period.
- The CTP sludge recycle rate remained at 400 gpm.
- CTP operators received no off-shift auto dialer call-out alarms.
- CTP operators performed three pumping events from the Lined Pond.
- CTP operators verified Aeration Basin pH probe and grab sample values twice per day.
- CTP operators performed daily inspections of the lime slurry holding tank, with no leaks or increased corrosion found this month.

No significant lessons to report for last month.

Lessons Learned

MONITORING PERIOD						
YEAR	MO	DAY		YEAR	MO	DAY
2017	8	1		2017	8	31

PARAMETER		Quantity or Loading			Quality or Concentration				FREQUENCY OF ANALYSIS	SAMPLE TYPE
		MONTHLY AVERAGE	DAILY MAXIMUM	UNITS	MINIMUM	MONTHLY AVERAGE	DAILY MAXIMUM	UNITS		
pH	Sample Measurement				6.99		7.24		Continuous	Meter
	Permit Required				6.0		10.0			
Flow Thru Treatment Plant	Sample Measurement	1.86	2.66	mgd						
	Permit Required		Daily							
Lead Total - Pb Effluent	Sample Measurement	0.04	0.06	lbs/day		0.003	0.003	mg/L	three samples/ week	Comp 24
	Permit Required	14.8	37.0			0.30	0.60	mg/L		
Zinc Total - Zn Effluent	Sample Measurement	4.50	7.04	lbs/day		0.29	0.41	mg/L	three samples/ week	Comp 24
	Permit Required	36.2	91.3			0.73	1.48	mg/L		
Cadmium - Cd Effluent	Sample Measurement	0.10	0.169	lbs/day		0.006	0.008	mg/L	three samples/ week	Comp 24
	Permit Required	2.40	6.10			0.050	0.100	mg/L		
Manganese - Mn Effluent	Sample Measurement	269	599	lbs/day		6.1	27.0	mg/L	three samples/ week	Comp 24
	No Permit Required					N/A	N/A	mg/L		
Total Suspended Solids - TSS	Sample Measurement	13.8	31	lbs/day		0.9	2.0	mg/L	three samples/ week	Comp 24
	Permit Required	985	1907			20	30	mg/L		

PREPARED BY: GARY FULTON

REVIEWED BY: BRIAN JOHNSON

**NPDES DISCHARGE POINT 006  
CENTRAL TREATMENT PLANT  
MONTH: Aug-17**

DAY	LEAD (Pb)		ZINC (Zn)		CADMIUM (Cd)		MANGANESE (Mn)		pH	FLOW mgd	TSS		LOADING kg/day
	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day			mg/L	lbs/day	
1		0.051		4.81		0.12		370		2.36		7.88	3.57
2	0.0026	0.040	0.244	3.77	0.0063	0.10	18.8	291	7.16	1.85	0.40	6.19	2.81
3		0.048		4.50		0.12		347		2.21		7.38	3.35
4	0.0026	0.038	0.337	4.91	0.0074	0.11	16.3	237	7.15	1.75	1.00	14.6	6.61
5		0.054		6.99		0.15		338		2.48		20.7	9.40
6		0.052		6.73		0.15		325		2.39		20.0	9.06
7	0.0026	0.051	0.273	5.37	0.0066	0.13	20.1	395	7.24	2.36	0.60	11.8	5.35
8		0.051		5.33		0.13		392		2.34		11.7	5.31
9	0.0026	0.052	0.288	5.79	0.0074	0.15	25.2	507	7.16	2.41	0.80	16.1	7.29
10		0.051		5.69		0.15		498		2.37		15.8	7.17
11	0.0026	0.052	0.317	6.35	0.0076	0.15	27.0	541	7.00	2.40	1.40	28.0	12.7
12		0.058		7.04		0.17		599		2.66		31.1	14.1
13		0.053		6.44		0.15		548		2.43		28.4	12.9
14	0.0026	0.051	0.263	5.13	0.0058	0.11	21.6	421	7.09	2.34	0.60	11.7	5.31
15		0.054		5.42		0.12		445		2.47		12.4	5.61
16	0.0026	0.049	0.256	4.82	0.0062	0.12	21.4	403	7.10	2.26	1.00	18.8	8.54
17		0.051		4.98		0.12		416		2.33		19.4	8.81
18	0.0029	0.057	0.228	4.47	0.0053	0.10	17.8	349	7.14	2.35	1.00	19.6	8.89
19		0.036		2.86		0.07		223		1.50		12.5	5.68
20		0.028		2.18		0.05		170		1.15		9.6	4.34
21	0.0026	0.038	0.346	5.12	0.0057	0.08	11.4	169	7.21	1.77	2.00	29.6	13.4
22		0.024		3.15		0.05		104		1.09		18.2	8.25
23	0.0026	0.033	0.405	5.14	0.0075	0.10	5.83	74.0	7.19	1.52	1.20	15.2	6.91
24		0.025		3.91		0.07		56.2		1.16		11.6	5.25
25	0.0026	0.025	0.363	3.48	0.0061	0.06	3.01	28.8	6.99	1.15	0.20	1.92	0.87
26		0.024		3.36		0.06		27.9		1.11		1.85	0.84
27		0.023		3.28		0.06		27.2		1.08		1.81	0.82
28	0.0026	0.023	0.221	2.00	0.0040	0.04	1.11	10.0	7.11	1.08	0.60	5.42	2.46
29		0.024		2.03		0.04		10.2		1.10		5.52	2.50
30	0.0026	0.025	0.238	2.28	0.0041	0.04	0.949	9.11	7.15	1.15	0.60	5.76	2.61
31		0.025		2.26		0.04		9.01		1.14		5.70	2.58
Total	0.0341	1.27	3.78	140	0.0800	3.09	190	8,342	92.7	57.8	11.4	426	193
Sample Events	13	31	13	31	13	31	31	31	13	31	13	31	31
Daily Average	0.003	0.041	0.291	4.50	0.006	0.100	6.1	269	7.13	1.86	0.88	13.8	6.24
Lab Detection Limit	<b>0.0026</b>		<b>0.004</b>		<b>0.0004</b>		<b>0.0025</b>		<b>0.01</b>		<b>0.800</b>		

MIN	0.003	0.023	0.221	1.995	0.004	0.036	0.949	9.012	6.990	1.082	0.200	1.808	0.820
MAX	0.003	0.058	0.405	7.037	0.008	0.169	27.000	599.338	7.240	2.660	2.000	31.077	14.094

Notes:

$(X \text{ mg/L}) * (1 \text{ kg}/10^6 \text{ mg}) * (2.205 \text{ lbs/kg}) * (3.785 \text{ L/gal}) * (10^6 \text{ gal/Mgal}) * (Y \text{ Mgal/day}) = (X) * (Y) * (8.345) \text{ in lbs/day}$

$(X \text{ lbs/day}) * (1 \text{ kg}/2.205 \text{ lbs}) = (X) / (2.205) \text{ in kg/day}$

verified by Brian Johnson, 09/12/17

**KELLOGG TUNNEL DISCHARGE  
CENTRAL TREATMENT PLANT  
MONTH: Aug-17  
Data from SVL**

DAY	LEAD (Pb)		ZINC (Zn)		CADMIUM (Cd)		MANGANESE (Mn)		pH s.u. SVL Lab	006 FLOW mgd	TSS		
	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day			mg/L	lbs/day	kg/day
1		14.16		1,692		2.99		1,918		2.36		3151	1429
2		11.12		1,329		2.35		1,507		1.85		2475	1122
3	0.719	13.26	85.9	1,584	0.152	2.80	97.4	1,796	2.90	2.21	160	2951	1338
4		10.48		1,252		2.21		1,419		1.75		2331	1057
5		14.90		1,781		3.15		2,019		2.48		3317	1504
6		14.36		1,715		3.04		1,945		2.39		3195	1449
7	0.645	12.68	83.6	1,643	0.153	3.01	101	1,985	3.03	2.36	161	3164	1435
8		12.60		1,632		2.99		1,972		2.34		3144	1426
9		12.97		1,681		3.08		2,030		2.41		3237	1468
10	0.594	11.74	82.8	1,636	0.149	2.94	99.2	1,960	3.07	2.37	111	2193	995
11		11.90		1,658		2.98		1,987		2.40		2223	1008
12		13.19		1,838		3.31		2,202		2.66		2464	1117
13		12.07		1,682		3.03		2,015		2.43		2255	1022
14	0.584	11.39	82.0	1,600	0.147	2.87	95.4	1,861	3.00	2.34	121	2361	1071
15		12.04		1,690		3.03		1,966		2.47		2494	1131
16		11.00		1,544		2.77		1,797		2.26		2279	1034
17	0.665	12.92	76.7	1,491	0.141	2.74	92.0	1,788	3.03	2.33	124	2410	1093
18		13.04		1,504		2.77		1,804		2.35		2432	1103
19		8.34		961.4		1.77		1,153		1.50		1554	704.9
20		6.36		733.5		1.35		879.8		1.15		1186	537.8
21	0.567	8.38	119	1,760	0.260	3.84	36.7	542.7	2.88	1.77	40	591.5	268.3
22		5.16		1,082		2.36		333.8		1.09		363.8	165.0
23		7.20		1,510		3.30		465.8		1.52		507.7	230.3
24	0.534	5.15	120	1,158	0.260	2.51	36.8	355.0	2.91	1.16	27	260.5	118.1
25		5.12		1,150		2.49		352.5		1.15		258.7	117.3
26		4.95		1,112		2.41		340.9		1.11		250.1	113.4
27		4.83		1,085		2.35		332.6		1.08		244.0	110.7
28	0.562	5.07	118	1,065	0.253	2.28	36.4	328.7	2.91	1.08	38	343.1	155.6
29		5.17		1,085		2.33		334.8		1.10		349.6	158.5
30		5.39		1,132		2.43		349.3		1.15		364.7	165.4
31	0.566	5.38	118	1,121	0.247	2.35	36.3	344.7	2.92	1.14	30	284.9	129.2
Total	5.44	302	886	43,906	1.76	83.8	631	40,086	26.7	57.8	812	54,633	24,777
Sample Events	9	31	9	31	9	31	9	31	6	31	9	31	31
Daily Average	0.604	9.8	98.4	1,416	0.196	2.70	70.1	1,293	4.44	1.86	90	1762	799

Notes:

$(X \text{ mg/L}) * (1 \text{ kg}/10^6 \text{ mg}) * (2.205 \text{ lbs/kg}) * (3.785 \text{ L/gal}) * (10^6 \text{ gal/Mgal}) * (Y \text{ Mgal/day}) = (X) * (Y) * (8.345) \text{ lbs/day}$

$(X \text{ lbs/day}) * (1 \text{ kg}/2.205 \text{ lbs}) = (X) / (2.205) \text{ kg/day}$

verified by Brian Johnson, 09/12/17

**PTM Effluent at Lined Storage Pond  
CENTRAL TREATMENT PLANT**

**Month: Aug-17**

<b>DATE</b>	<b>LEAD mg/L</b>	<b>ZINC mg/L</b>	<b>CADMIUM mg/L</b>	<b>pH s.u. CTP Lab</b>	<b>TSS mg/L</b>
08/03/17	0.0039	11.1	1.31	6.62	0.6
08/17/17	0.0028	9.85	1.22	7.02	0.6

**RINSATE AND TRIP BLANKS  
CENTRAL TREATMENT PLANT**

**Month: Aug-17**

**Rinsate and Trip Blank samples will be taken approximately every 20  
QC events, or one each per month.**

<b>LOCATION</b>	<b>DATE</b>	<b>SAMPLE</b>	<b>LEAD mg/L</b>	<b>ZINC mg/L</b>	<b>CADMIUM mg/L</b>
<b>Rinsate &amp; Trip Blank</b>					
006 Treated Outfall		RB-08-02-17	<0.008	<0.010	<0.002
Trip Blank (D.I.water)		TB-08-02-17	<0.008	<0.010	<0.002

*verified by Brian Johnson, 09/12/17*

## Daily log August 2017

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**CENTRAL TREATMENT PLANT****MISCELLANEOUS FLOWS**

Month : Aug-17

Date	KT Flow Meter Reading
7/31/2017	0
8/31/2017	58,550,600
Total	58,550,600

Date	006 Flow Meter Reading
7/31/2017	0
8/31/2017	57,756,400
Total	57,756,400

Sweeny Pump Station Reading				
Date	#1 Pump	620 gpm	#2 Pump	500 gpm
7/31/2017	170.0	Hours	785.0	Hours
8/31/2017	170.0	Hours	785.0	Hours
Total Hours	0.0	Hours	0.0	Hours
Total Flow for 004/Sweeny For The Month =				0 Gallons

Date	Lined Storage Pond Water Level			
7/31/2017	750,000	gal	Elev. =	2268.5
8/31/2017	750,000	gal	Elev. =	2268.5

**Lined Storage Pond Influent Flows****PTM Discharge Flow**

Date	Flow (gpm)
08/03/17	7.0
08/17/17	7.0

**Old Mine Line Discharge Flow**

Date	Flow (gpm)
NA	NA

### 2017-May 03 to 2018-May 02 BHCTP LIME USAGE AFW

Month	Silo A						Silo B						Total	
	Initial Level	Final Level	Diff. (ft)	Diff. (tons)	Tons Added	Net Tons	Initial Level	Final Level	Diff. (ft)	Diff. (tons)	Tons Added	Net Tons	Net Tons	Tons/Day
May 3-May 31	16.00	16.00	0.0	0.0	0.00	0.0	14.00	7.30	6.7	36.1	183.79	219.9	219.9	7.58
June 1-June 30	16.00	11.40	4.6	24.8	83.42	108.2	7.30	13.2	-5.9	-31.8	67.10	35.3	143.5	4.78
July 1-July 31	11.40	11.00	0.4	2.2	0.00	2.2	13.20	8.50	4.7	25.3	114.10	139.4	141.6	4.57
August 1-August 31	11.00	15.80	-4.8	-25.9	40.50	14.6	8.50	16.3	-7.8	-42.0	115.00	73.0	87.6	2.83
Sept. 1 - Sept 30	15.80	15.80	0.0	0.0	0.00	0.0	16.30	16.30	0.0	0.0	0.00	0.0	0.0	0.00
			0.0	0.0		0.0			0.0	0.0	0.00	0.0	0.0	0.00

**Silo A      123.92**

**Silo B      479.99**

592.6

#### NOTES:

**Tdl Tons Purchased      603.91**

**Average      6.18**

May 3, 2017 A= 16.0 B = 14.0 AFW Beginning Levels

01-25-17 Placed slaker/silo B into service, slaker/silo A in six month standby mode.

04-20-17 Placed 4.9 ton into silo A and 31.1 ton into silo B, fill in preparation for contract changeover.

05-23-17 Received the initial Pete Lien & Sons lime delivery of 39.20 tons - Silo B

05-30-17 Received Pete Lien & Sons lime delivery of 37.50 tons - Silo B

06-01-17 Received Pete Lien & Sons lime delivery of 39.0 tons - Silo B

06-04-17 Removed Lime System B (Slaker B) from service and placed Lime System A into service. Lime System B in fail mode (lime feed auger has failed).

06-04-17 12:30 Operator measured the void space in Silo B at 9.0'. The silo B level indicator display reading at this time was 10.7'.

06-06-17 28.1 Tons placed into Silo B, **11.3 Tons placed into Silo A - Silo B Cone/Stack issues prevented loading entire truck into Silo B (15.1 ft)**

06-07-17 11:00 Placed slaker/silo A into service, placed slaker/silo B into standby mode

06-13-17 Drained and cleaned slaker B. 06-14-17 Drained and cleaned slaker A.

06-28-17 08:00 Slaker A removed from service, slaker B placed into service. Operators replaced the #2 lime loop pressure valve rubber body and slaker A drive shaft packing.

07-10-17 06:30 Slaker B removed from service due to a lime feed issue. Slaker A placed into service. Operators will investigate when time allows.

08-09-17 36 Tons placed into Silo B, 2 Tons placed into Silo A

08-22-17 Slaker B (Silo B) removed from service, Slaker A (Silo A) placed into service - Six Month Rotation- Lime loop #2 off, Lime loop #1 on -Six Month Rotation-

#### Lime Silo A Depth Readings

Date	Prior	After	Tons Received	Tons/ft
6/6/2017	14.6	16.7	11.30	5.38
6/15/2017	9.5	14.6	36.02	7.06
6/22/2017	10.1	15.2	36.10	7.08
8/9/2017	11.0	11.2	2.00 Estimated	10.00
8/28/2017	10.1	16.0	38.50	6.53

#### Lime Silo B Depth Readings

Date	Prior	After	Tons Received	Tons/ft
5/22/2017	7.7	11.4	39.2	10.59
5/30/2017	3.5	7.5	37.5	9.38
6/1/2017	6.5	13.3	39.0	5.74
6/5/2017	10.8	15.1	28.1	6.53
7/10/2017	6.6	11.2	39.6	8.61
7/12/2017	10.5	17.0	35.0	5.38
7/31/2017	4.8	8.5	39.5	10.68
8/7/2017	6.4	11.3	39.5	8.06
8/9/2017	10.6	17.2	37.0 Estimated	5.61
8/21/2017	10.9	16.5	38.5	6.88

KELLOGG TUNNEL ANNUAL DISCHARGE FLOWS 2000-2009										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Jan.	61,000,000	61,677,510	54,606,100	53,066,890	52,223,080	53,150,000	56,050,900	56,281,000	53,465,820	50,936,960
Feb.	57,600,000	45,584,000	52,840,000	46,493,470	48,306,920	49,860,000	51,188,000	50,511,300	49,282,209	48,146,111
March	60,730,000	57,740,360	50,452,060	60,162,290	59,852,720	58,073,000	56,332,830	65,443,650	54,578,130	61,712,540
April	68,680,000	54,846,000	65,583,230	63,335,350	50,715,310	53,775,350	72,039,280	66,636,500	61,690,530	63,055,350
May	97,719,900	57,501,901	76,082,410	63,335,350	53,245,000	54,181,650	72,027,000	63,203,308	86,680,760	70,233,580
June	69,800,000	55,835,590	67,299,960	59,532,434	50,451,170	51,750,000	68,385,600	57,981,410	82,622,590	64,623,180
July	63,698,850	53,652,330	64,820,120	66,252,746	56,538,980	55,255,000	64,054,000	58,282,900	66,324,500	61,535,000
Aug.	66,707,120	45,289,000	58,212,940	62,074,750	52,002,140	49,970,000	64,621,000	55,335,900	65,168,620	56,446,670
Sept.	55,797,530	50,276,020	60,140,460	43,789,000	49,208,020	49,987,000	54,515,270	50,471,870	61,074,020	57,006,430
Oct.	60,424,720	50,660,840	54,485,871	52,869,290	59,601,690	52,807,000	57,610,030	50,086,330	58,666,300	55,830,000
Nov.	53,408,660	50,660,840	51,072,259	47,600,000	51,948,000	50,722,600	55,191,700	50,779,040	52,041,780	54,956,800
Dec.	56,414,870	53,464,780	56,034,000	56,413,080	56,770,000	54,904,400	60,486,900	53,716,210	55,727,260	54,542,700
Totals	771,981,650	637,189,171	711,629,410	674,924,650	640,863,030	634,436,000	732,502,510	678,729,418	747,322,519	699,025,321

KELLOGG TUNNEL ANNUAL DISCHARGE FLOWS 2010-2019										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Jan.	55,503,180	61,797,170	58,434,610	61,855,400	57,478,450	58,440,540	52,196,730	49,352,650		
Feb.	50,819,910	54,556,227	57,763,170	59,383,290	54,607,950	59,767,470	53,694,400	53,675,440		
March	54,691,420	61,373,630	67,236,650	66,264,780	65,396,350	64,468,230	63,967,920	58,977,410		
April	56,255,340	65,687,340	81,233,630	69,619,100	65,618,770	63,056,840	63,323,620	61,947,620		
May	58,825,640	84,365,390	86,826,340	71,496,380	80,598,590	61,898,200	58,147,240	84,208,694		
June	56,770,200	79,985,540	83,440,990	64,663,900	65,623,330	56,368,540	53,149,810	73,144,700		
July	56,727,510	79,346,330	74,315,690	62,844,790	63,425,030	55,655,000	56,521,710	69,470,550		
Aug.	56,239,370	70,377,570	68,986,900	58,459,380	61,486,270	55,316,100	53,293,430	58,550,600		
Sept.	54,109,980	60,404,280	62,270,300	58,097,500	56,279,590	53,890,000	49,796,420			
Oct.	55,480,200	62,403,480	59,991,850	58,325,780	60,659,850	52,082,800	52,417,120			
Nov.	54,856,880	58,430,700	57,184,220	56,215,000	55,065,100	49,812,540	53,815,710			
Dec.	54,607,330	58,617,700	61,750,390	56,932,530	59,770,540	51,521,900	52,063,110			
Totals	664,886,960	797,345,357	819,434,740	744,157,830	746,009,820	682,278,160	662,387,220	509,327,664	0	0

Yellow indicates record monthly flow as well as record annual flow

# KELLOGG TUNNEL ZINC DATA

		Concentration (mg/L)												
Month	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Jan.		86	81	79	63	70	61	72	57	68	41	46	50	53
Feb.		86	91	96	55	72	57	95	58	68	41	68	52	50
March		94	116	86	65	68	53	86	58	69	58	81	63	124
April		98	121	140	85	80	50	137	176	86	107	92	115	238
May		105	231	179	318	136	57	377	215	150	177	87	138	206
June		107	182	118	271	143	68	347	164	106	131	78	108	145
July		90	144	111	198	117	75	181	136	87	87	75	81	97
Aug.		87	112	92	132	94	79	130	110	86	76	66	76	98
Sept.		84	107	80	107	76	81	132	107	75	66	63	68	
Oct.	59	81	100	88	99	75	70	86	70	67	63	54	52	
Nov.	66	79	88	88	104	63	57	95	71	70	55	44	52	
Dec.	67	62	78	65	76	59	61	88	69	54	49	55	50	
average	64	88	121	102	131	88	64	152	108	82	79	67	75	126
lime usage (tons/day)		2.59	3.23	2.76	4.78	3.24	2.16	4.31	3.93	2.46	2.70	1.99	1.93	
Zinc Conc. Increase/Decrease			37%	-16%	29%	-33%	-27%	138%	-29%	-24%	-4%	-15%	12%	
Lime Usage Increase/Decrease			25%	-15%	73%	-32%	-33%	100%	-9%	-37%	10%	-26%	-3%	

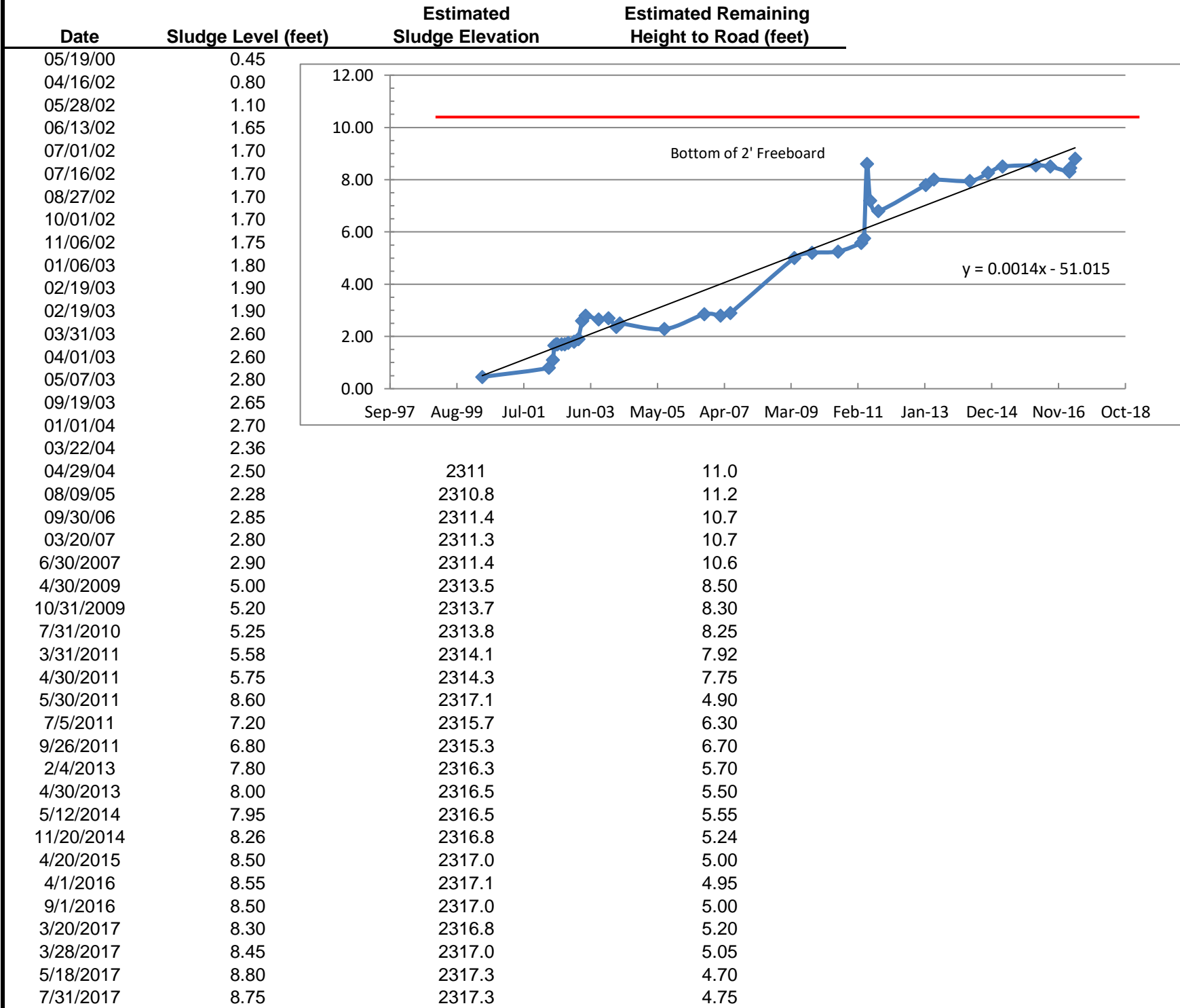
## LIME DEMAND TRACKING

Year	Month	Lime (tons)	KT flow (mg)	Lime Demand (g/L)	
2006	Jan.	70.2	56.0	0.30	
	Feb.	69.9	51.2	0.33	
	March	96.3	56.3	0.41	
	April	107.5	72.0	0.36	
	May	235.4	72.0	0.78	peak
	June	114.6	68.3	0.40	
	July	100.4	64.0	0.38	
	Aug.	118.2	64.1	0.44	
	Sept.	38.4	54.5	0.17	
	Oct.	69.5	57.6	0.29	
	Nov.	71.3	55.2	0.31	
	Dec.	78.2	60.5	0.31	
2007	Jan.	66.0	56.3	0.28	
	Feb.	51.8	50.5	0.25	
	March	81.7	65.4	0.30	
	April	127.9	66.6	0.46	
	May	154.0	63.2	0.58	peak
	June	94.1	57.9	0.39	
	July	107.0	58.3	0.44	
	Aug.	75.8	55.3	0.33	
	Sept.	77.2	50.5	0.37	
	Oct.	62.3	50.1	0.30	
	Nov.	56.9	50.8	0.27	
	Dec.	28.1	52.0	0.13	
2008	Jan.	60.7	53.4	0.27	
	Feb.	50.2	49.3	0.24	
	March	58.0	54.6	0.25	
	April	78.3	61.7	0.30	
	May	629.3	86.7	1.74	peak
	June	388.1	82.6	1.13	
	July	155.6	66.3	0.56	
	Aug.	129.5	65.2	0.48	
	Sept.	97.2	61.1	0.38	
	Oct.	76.4	58.7	0.31	
	Nov.	64.9	52.0	0.30	
	Dec.	73.0	55.7	0.31	
2009	Jan.	70.3	50.9	0.33	
	Feb.	60.3	48.2	0.30	
	March	62.1	61.7	0.24	
	April	88.0	63.1	0.33	
	May	180.9	70.2	0.62	peak
	June	146.3	64.6	0.54	
	July	104.4	61.6	0.41	
	Aug.	94.8	56.4	0.40	
	Sept.	89.2	57.0	0.38	
	Oct.	69.4	55.8	0.30	
	Nov.	70.9	55.0	0.31	
	Dec.	47.4	54.5	0.21	
2010	Jan.	66.7	55.5	0.29	
	Feb.	51.5	50.8	0.24	
	March	49.5	54.7	0.22	
	April	50.0	56.3	0.21	
	May	58.7	58.8	0.24	
	June	58.8	56.8	0.25	
	July	79.7	56.7	0.34	peak
	Aug.	54.7	56.2	0.23	
	Sept.	63.8	54.1	0.28	
	Oct.	54.6	55.4	0.24	
	Nov.	54.1	55.8	0.23	
	Dec.	64.5	54.6	0.28	
2011	Jan.	77.1	61.7	0.30	
	Feb.	69.8	54.6	0.31	
	March	94.7	61.4	0.37	
	April	119.6	65.6	0.44	
	May	433.0	84.4	1.23	peak
	June	328.4	80.0	0.98	
	July	159.9	79.3	0.48	
	Aug.	120.8	70.3	0.41	
	Sept.	92.4	60.4	0.37	
	Oct.	97.8	62.4	0.38	
	Nov.	66.8	58.4	0.27	
	Dec.	65.2	58.6	0.27	

## LIME DEMAND TRACKING

Year	Month	Lime (tons)	KT flow (mg)	Lime Demand (g/L)	
2012	Jan.	74.9	58.4	0.31	
	Feb.	56.8	57.7	0.24	
	March	85.6	67.2	0.31	
	April	194.8	81.2	0.57	
	May	261.6	86.8	0.72	peak
	June	179.9	83.4	0.52	
	July	140.8	74.3	0.45	
	Aug.	118.0	68.9	0.41	
	Sept.	95.6	62.2	0.37	
	Oct.	89.0	60.0	0.36	
	Nov.	73.3	57.2	0.31	
	Dec.	74.8	61.8	0.29	
2013	Jan.	57.2	61.9	0.22	
	Feb.	64.5	59.4	0.26	
	March	71.7	66.2	0.26	
	April	96.9	69.6	0.33	
	May	126.2	71.5	0.42	peak
	June	94.1	64.6	0.35	
	July	91.2	62.8	0.35	
	Aug.	89.2	58.4	0.37	
	Sept.	65.2	58.0	0.27	
	Oct.	59.3	58.3	0.24	
	Nov.	50.9	56.2	0.22	
	Dec.	49.9	56.9	0.21	
2014	Jan.	38.7	57.4	0.16	
	Feb.	35.8	54.6	0.16	
	March	73.1	65.3	0.27	
	April	101.1	65.6	0.37	
	May	208.3	80.6	0.62	peak
	June	127.4	65.6	0.47	
	July	87.5	63.4	0.33	
	Aug.	81.1	61.5	0.32	
	Sept.	63.7	56.3	0.27	
	Oct.	53.1	60.6	0.21	
	Nov.	62.8	55.0	0.27	
	Dec.	54.6	59.7	0.22	
2015	Jan.	51.7	58.4	0.21	
	Feb.	61.0	59.7	0.24	
	March	83.1	64.4	0.31	
	April	94.8	63.0	0.36	peak
	May	73.3	62.0	0.28	
	June	69.7	65.3	0.26	
	July	83.6	55.6	0.36	
	Aug.	58.4	55.3	0.25	
	Sept.	55.3	53.9	0.25	
	Oct.	56.8	52.0	0.26	
	Nov.	46.3	49.8	0.22	
	Dec.	43.7	51.5	0.20	
2016	Jan.	24.2	52.2	0.11	
	Feb.	33.4	53.6	0.15	
	March	66.0	64.0	0.25	
	April	86.1	63.3	0.33	
	May	96.9	58.1	0.40	peak
	June	69.9	53.1	0.32	
	July	68.2	56.5	0.29	
	Aug.	53.7	53.2	0.24	
	Sept.	53.6	49.8	0.26	
	Oct.	49.8	52.4	0.23	
	Nov.	48.7	53.8	0.22	
	Dec.	48.3	52.0	0.22	
2017	Jan.	51.7	49.3	0.25	
	Feb.	46.9	53.7	0.21	
	March	140.0	59.0	0.57	
	April	174.5	61.9	0.68	
	May	246.6	84.2	0.70	peak
	June	143.5	73.1	0.47	
	July	139.4	69.4	0.48	
	Aug.	87.6	58.5	0.36	

### Bunker Hill Sludge Pond Sludge Staff Gauge Reading Summary



**6282      8.30      Total Change, Days and Feet**

Note 3	0.48	Average Rise Per Year (Includes Lined Pond Cleanout), feet
	4.75	Estimated average remaining total height to perimeter road, feet
	2.0	Assumed desired end-of-life freeboard, feet
	2.8	Estimated available storage height, feet

**5.7      Estimated Remaining Life (years)**

1/28/2023

Notes:

1) Pond perimeter road centerline elevation = 2322.0 feet from CIA as-builts Drawing C-28

## CTP Mine Water Line Open Channel Inspection Form

**Note:** This form should be utilized weekly during the regular channel cleanout.

Results will be include with the Daily Quality Control Report and monthly DMR.

Date: August 3, 2017 Inspected By: Gary Coast, Steve Brunner

Item Inspected	Condition	Comments
Channel Sections and Joints	Good / Poor	Check for cracks Ok
Channel Inlet Connection @ KT	Good / Poor	Check for cracks Ok
Channel Outlet/Pipeline Inlet	Good / Poor	Check for cracks Ok
Channel Bottom (during low flows)	Good / Poor	Concrete walls show signs of pitting. Ok
Bottom Joints (during low flows)	Good / Poor	Ok
Trash Rack Assembly Rail Units	Good / Poor	Check for corrosion and bolt tightness Ok
Trash Racks	Good / Poor	No debris
Parshall Flume	Good / Poor	Check fiberglass and joint connections Ok Flume staff guage needs replaced

### General Comments:

The Kellogg Tunnel flow at this time is 2.45 mgd (1700 gpm), pH at this time is 3.05

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

No debris or sediment was collected from the mine discharge flume during this cleaning event

Discussed the pigging activities with the mine owner and mine manager.

There were no discussions in regards to flow or mine pump activity.



## CTP Mine Water Line Open Channel Inspection Form

**Note:** This form should be utilized weekly during the regular channel cleanout.

Results will be include with the Daily Quality Control Report and monthly DMR.

Date: August 10, 2017 Inspected By: Gary Coast, Steve Brunner

Item Inspected	Condition	Comments
Channel Sections and Joints	Good / Poor	Check for cracks Ok
Channel Inlet Connection @ KT	Good / Poor	Check for cracks Ok
Channel Outlet/Pipeline Inlet	Good / Poor	Check for cracks Ok
Channel Bottom (during low flows)	Good / Poor	Concrete walls show signs of pitting/corrosion
Bottom Joints (during low flows)	Good / Poor	Ok
Trash Rack Assembly Rail Units	Good / Poor	Check for corrosion and bolt tightness Ok
Trash Racks	Good / Poor	Removed small amount of wood debris from rack
Parshall Flume	Good / Poor	Check fiberglass and joint connections Ok Flume staff gauge needs replaced

### General Comments:

The Kellogg Tunnel flow at this time is 2.39 mgd (1659 gpm), pH at this time is 2.85.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

No debris or sediment was collected from the mine discharge flume during this cleaning event.

## CTP Mine Water Line Open Channel Inspection Form

**Note:** This form should be utilized weekly during the regular channel cleanout.

Results will be include with the Daily Quality Control Report and monthly DMR.

Date: August 17, 2017

Inspected By:

Gary Fulton, Steve Brunner

Item Inspected	Condition	Comments
Channel Sections and Joints	Good / Poor	Check for cracks Ok
Channel Inlet Connection @ KT	Good / Poor	Check for cracks Ok
Channel Outlet/Pipeline Inlet	Good / Poor	Check for cracks Ok
Channel Bottom (during low flows)	Good / Poor	Concrete walls show signs of pitting/corrosion
Bottom Joints (during low flows)	Good / Poor	Ok
Trash Rack Assembly Rail Units	Good / Poor	Check for corrosion and bolt tightness Ok
Trash Racks	Good / Poor	Wood debris & Grass Clippings were removed
Parshall Flume	Good / Poor	Check fiberglass and joint connections Ok Flume staff gauge needs replaced

General Comments:

The Kellogg Tunnel flow at this time is 2.38 mgd (1653 gpm), pH at this time is 2.87.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Wood debris and grass clippings were removed from the mine discharge flume during this cleaning event.

No discussions occurred with any of the mine personnel.

## CTP Mine Water Line Open Channel Inspection Form

**Note:** This form should be utilized weekly during the regular channel cleanout.

Results will be include with the Daily Quality Control Report and monthly DMR.

Date: August 24, 2017

Inspected By:

Gary Coast, Steve Brunner

Item Inspected	Condition	Comments
Channel Sections and Joints	Good / Poor	Check for cracks Ok
Channel Inlet Connection @ KT	Good / Poor	Check for cracks Ok
Channel Outlet/Pipeline Inlet	Good / Poor	Check for cracks Ok
Channel Bottom (during low flows)	Good / Poor	100 gallons of sediment collected Concrete walls show signs of pitting/corrosion
Bottom Joints (during low flows)	Good / Poor	Ok
Trash Rack Assembly Rail Units	Good / Poor	Check for corrosion and bolt tightness Ok
Trash Racks	Good / Poor	No debris ok
Parshall Flume	Good / Poor	Check fiberglass and joint connections Ok Flume staff gauge needs replaced

General Comments:

The Kellogg Tunnel flow at this time is 1.15 mgd (798 gpm), pH at this time is 2.27.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed approximately 100 gallons of sediment from the KT flume.

All sediment collected from the KT flume was disposed of at the CIA sludge pond.

No discussions occurred with any of the mine operating personnel.

## CTP Mine Water Line Open Channel Inspection Form

**Note:** This form should be utilized weekly during the regular channel cleanout.

Results will be include with the Daily Quality Control Report and monthly DMR.

Date: August 31, 2017 Inspected By: Gary Coast, Gary Fulton

Item Inspected	Condition	Comments
Channel Sections and Joints	Good / Poor	Check for cracks Ok
Channel Inlet Connection @ KT	Good / Poor	Check for cracks Ok
Channel Outlet/Pipeline Inlet	Good / Poor	Check for cracks Ok
Channel Bottom (during low flows)	Good / Poor	Concrete walls show signs of pitting/corrosion
Bottom Joints (during low flows)	Good / Poor	Ok
Trash Rack Assembly Rail Units	Good / Poor	Check for corrosion and bolt tightness Ok
Trash Racks	Good / Poor	Small amount of wood removed
Parshall Flume	Good / Poor	Check fiberglass and joint connections Ok Flume staff gauge needs replaced

### General Comments:

The Kellogg Tunnel flow at this time is 1.12 mgd (780 gpm), pH at this time is 2.68.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

A small amount of wood debris was removed from the trash racks during this cleaning event.

No discussions took place between the mine management and the CTP operators.